Glossary

LIST OF ACRONYMS

AIPC =	Area of Influence, Precipitation-Corrected
CDB =	County Data Base
DCF =	Dose Conversion Factor
DHIA =	Dairy Herd Improvement Association
DOE =	Department of Energy
EML =	Environmental Measurements Laboratory
EPA =	Environmental Protection Agency
GMT =	Greenwich Mean Time
GSD =	Geometric Standard Deviation
HASL =	Health and Safety Laboratory
ICRP =	International Commission on Radiological Protection
MSL =	Mean Sea Level
NCI =	National Cancer Institute
NCRP =	National Council on Radiation Protection and Measurements
NOAA =	National Oceanic and Atmospheric Administration
NRC =	National Research Council
NRL =	Naval Research Laboratory
NTS =	Nevada Test Site
ORERP =	Offsite Radiation Exposure Review Project
PHS =	Public Health Service
TDB =	Town Data Base
TOA =	Time of Arrival
UNSCEAR =	United Nations Scientific Committee on the Effects of Atomic Radiation
USDA =	United States Department of Agriculture
USNRC =	United States Nuclear Regulatory Commission

DEFINITION OF INDICES

bc =   backyard cow

c =   cow

cl =   calibrated

dry =   dry weather conditions (no precipitation)

gt =   goat

i or ii =   county within the contiguous United States

j =   day of ^{131}I deposition on the ground

k =   age and sex group

mc =   milk from a cow

md =   cows' milk drinker

mm =   mother's milk

mo =   month

mt =   mother

oe =   other exposure routes

p =   pasture grass or vegetation

pr =   pasture region

q =   category of milk

rg or rr =   milk region

rs =   resuspension

s =   state

sc =   scenario or sub-county

sl =   soil

t =   time

te =   test

th =   thyroid

ts =   test series

vw =   volume weighted

w =   water

wet =   wet atmospheric conditions (rain or snow)

DEFINITION OF SYMBOLS

A = activity, Ci

A_p = activity that is intercepted by vegetation

A_{rs} = activity in vegetation due to resuspension of soil, Ci

A_{sl} = activity deposited on the soil

AD = average density of air, 1.2 kg m^{-3}

BR = breathing rate, m3 d^{-1}

BWT = cow's body weight, kg

C = number of cows

Ci = Curie

C_p = average concentration of ^{131}I in pasture grass

C_w = average concentration of ^{131}I in water

CK = coefficient of proportionality

CP = average milk production per cow, L d^{-1}

CR = consumption rate, kg d^{-1}

C_{th} = maximum concentration of ^{131}I in the thyroid, mCi kg^{-1}

d = day

D = thyroid dose from beta and gamma irradiation, rad

DCF = thyroid dose per unit intake of ^{131}I, also called dose conversion factor, rad nCi^{-1} or mrad nCi^{-1}

DG = deposition density per unit area of ground, nCi m^{-2}

DIF = test value for indication of surplus of milk

DM = daily dry matter intake, kg d^{-1}, by cows

E_b = the average energy, 0.18 MeV per disintegration of beta rays resulting from the decay of ^{131}I

EC = expected annual consumption of milk, L y-1

EF = in-storm evaporation fraction per unit areal density of vegetation, m2 kg^{-1}(dry mass)

f = fractional uptake by the thyroid of the ^{131}I activity that reaches the bloodstream following inhalation or ingestion

f_m = intake-to-milk transfer coefficient for cows, d L^{-1}

F = interception factor

FA = number of farms

F^* = mass interception factor, m^2 kg^{-1}, dry mass

FAT =   fat yield, kg d-1

FCC =   quotient of the ^{131}I concentrations in cottage cheese and in cows' milk at the time of production, nCi kg^{-1} per nCi L^{-1}

FCM =   4% fat-corrected milk production, kg

FMD =   fraction of milk drinkers

FP =   fraction of the cows' diet derived from pasture

F_{sl} =   fallout activity on soil, nCi m^{-2}

g =   average geometrical factor for the thyroid, equal to 3π r for spheres with radii, r less than 10 cm

G =   specific gamma-ray constant for ^{131}I (2.2 R h^{-1} per mCi at 1 cm)

H+12 =   12 hours after detonation; standard time to report exposure rates

ILV =   time-integrated concentration of ^{131}I in leafy vegetables, nCi d kg^{-1}

IC =   time-integrated concentration of ^{131}I, nCi d L^{-1}, nCi d kg^{-1} or nCi d m^{-3}

IMC =   time-integrated concentration of ^{131}I in milk fresh from cow (also called fresh cows' milk, nCi d L^{-1})

IMC_{bc} =   time-integrated concentration of ^{131}I in milk from backyard cows, nCi d L^{-1}

IMC_{inh} =   time-integrated concentration of ^{131}I in fresh cows' milk resulting from inhalation of ^{131}I-contaminated air

IMC_{p} =   time-integrated concentration of ^{131}I in fresh cows' milk resulting from the consumption of ^{131}I-contaminated pasture

IMC_{q} =   time-integrated concentration of ^{131}I in the category, q, of commercial milk, nCi d L^{-1}

IMC_{sl} =   time-integrated concentration of ^{131}I in fresh cows' milk resulting from the ingestion of ^{131}I-contaminated soil

IMC_{vw} =   time-integrated concentration of ^{131}I in volume-weighted commercial milk, nCi d L^{-1}

IMM =   time-integrated concentration of ^{131}I in mothers' milk, nCi d L^{-1}

L =   liter

m_{th} =   mass of the thyroid, g

MB =   milk balance in a year, L y^{-1}

MCF =   milk consumed on farms in a year, L y^{-1}

MM =   milk used in manufacture of food products in a year, L y^{-1}

MP =   milk produced in a year, L y^{-1}

MUF =   milk used on the farm in a year, L y^{-1}

MY =   milk yield in a day, kg d^{-1}

OF =   occupancy factor; fraction of time spent either indoors or outdoors

PBWT =   percentage of cow's body weight to be fed to the cow per day

P_i =   precipitation index

PI =   daily pasture intake, kg, dry mass d^{-1}

POP =   population

R =   daily amount of rain, L m^{-2}

RC =   resuspension coefficient, m^{-1}

RIO =   ratio of time-integrated concentrations of ^{131}I indoors and outdoors

Rs_{cl} =   rainfall storage capacity per unit areal density of vegetation

S =   rate of soil consumption, kg d^{-1}

T_b =   radiological half-time of retention of stable iodine in the thyroid, d

T_e =   effective half-time of retention of ^{131}I on vegetation, d

T_{eff} =   effective half-time of retention of ^{131}I in the thyroid, d

T_r =   radioactive half-life of ^{131}I, d

T_w =   environmental half-time, d

TD =   time delay between production and consumption of foodstuffs, d

TF =   transfer of ^{131}I from deposition on the ground to activity intake by cow

TIC =   time-integrated concentration

TMFU =   total volume of milk available for fluid use in a year, L y^{-1}

TMP =   sum of milk production in all the counties in a state with a milk surplus

TN =   deficit of milk in a milk region

TP =   volume of milk available from the counties in a milk region with a surplus of milk

U_{sl} =   soil density, kg m^{-3}

v_g =   deposition velocity, m d^{-1}

VOL_q =   annual volume of milk in category q, L y^{-1}

WR =   wash-out ratio, nCi kg^{-1} (rain) per nCi kg^{-1} (air)

X =   distance from NTS, km

Y =   standing crop biomass, kg (dry mass) m^{-2}

α =   foliar interception constant, m^2 kg^{-1} (dry)

Γ =   specific gamma-ray constant of ^{131}I, 2.2 R/h per mCi at 1 cm

λ_r =   radioactive decay constant, d^{-1}

λ_w =   rate constant for decreased activity due to environmental removal processed, d^{-1}

λ_e =   effective rate constant, d^{-1}

DEFINITION OF TERMS

Absorbed dose: see Dose.

Activity: The amount of a radioactive nuclide in a particular energy state at a given time. It is the quotient of dN by dt, where dN is the expectation value of the number of spontaneous nuclear transitions from that energy state in the time interval dt. Names for the unit of activity are becquerel, Bq and curie, Ci.

Activity median aerodynamic diameter, AMAD: The diameter of a unit density sphere with the same terminal settling velocity in air as that of the aerosol particle whose activity is the median for the entire aerosol.

Area-of-influence precipitation-corrected, AIPC method: Method devised in this report to estimate the ^{131}I deposition densities in counties where measurements were not available.

Atom: The smallest particle of an element that is capable of entering into a chemical reaction.

Atomic mass: The mass of an atom relative to other atoms. The present-day basis of the scale of atomic masses is carbon; the most common isotope of this element has arbitrarily been assigned an atomic mass of 12. The unit of the scale is 1/12 the mass of the carbon-12 atom, or roughly the mass of one proton or one neutron. The atomic mass of any element is approximately equal to the total number of protons and neutrons in its nucleus.

Backyard cow: Cow kept to provide the milk requirements of only an individual family.

Becquerel: The specific name for the unit of activity in the SI system of units: $1 \text{ Bq} = 1 \text{ s}^{-1}$.

Beta ray, or beta particle: A charged particle emitted from the nucleus of an atom and having a mass and charge equal in magnitude to those of the electron.

Biological half-life: The time required for a biological system, such as a person, to eliminate by natural processes, other than radioactive decay, one-half of the amount of a substance, such as a radionuclide, that has entered it.

Coefficient of variation: The standard deviation divided by the value of the parameter considered.

Curie: The unit of activity used in this report. It is the quantity of a radioactive nuclide disintegrating at the rate of 3.7 10^{10} disintegrations per second,, abbreviated: Ci. Several multiples and fractions of the curie are in common usage and also are used in this report:

Megacurie: One million curies, 3.7 10^{16} disintegrations per second, abbreviated MCi.

Kilocurie: One thousand curies, 3.7 10^{13} disintegrations per second, abbreviated kCi.

Millicurie: One thousandth of a curie, 3.7 10^7 disintegrations per second, abbreviated mCi.

Microcurie: One millionth of a curie, 3.7 10^4 disintegrations per second, abbreviated μCi.

Nanocurie: One billionth of a curie, 37 disintegration per second, abbreviated nCi.

Picocurie: One millionth of a microcurie, 0.037 disintegration per second, abbreviated pCi.

Femtocurie: One billionth of a microcurie, 3.7 10^{-5} disintegration per second, abbreviated fCi.

Decay constant: The fraction of a number of atoms of a radioactive nuclide that decays in unit time.

Decay product: A nuclide resulting from the radioactive disintegration of a radionuclide, being formed either directly or as a result of successive transformations in a radioactive series. A decay product may be either radioactive or stable.

Deposition density: The activity, of a radionuclide deposited per unit area of ground.

Dose: A general term denoting the quantity of radiation or energy absorbed per unit of mass. For special purposes, it must be appropriately qualified. If unqualified, it refers to absorbed dose. The unit of absorbed dose used in this report is the rad, 1 rad = 100 erg g^{-1}. In the SI system of units, the unit of absorbed dose is the gray, Gy. One Gy = 100 rad = 1 J kg^{-1}.

Effective half-life: The time required for the amount of a radionuclide deposited in a living organism to be diminished 50 percent as a result of the combined action of radioactive decay and biological elimination.

Electron: An elementary particle with a unit negative electrical charge and a mass 1/1837 that of the proton. Electrons surround the positively charged nucleus and determine the chemical properties of the atom.

Electron-volt: A unit of energy equivalent to the amount of energy gained by an electron in passing through a potential difference of one volt, abbreviated: eV; 1 eV = 1.6 x 10-12 erg. Multiple units of the electron volt are used in this report, namely: "keV" for thousand electron volts and "MeV" for million electron volts.

Euthyroid: A thyroid that functions normally.

Exposure:

1. A term generally used to mean subjected to or being in the presence of radioactivity or radiation.

2. A measure of the ionization produced in air by x or gamma radiation. It is the sum of the electrical charges of all ions of one sign produced in air when all electrons liberated by photons in a volume element of air are completely stopped in air, divided by the mass of the air in the volume element. The unit of exposure used in this report is the roentgen, R. In the SI system of units, the unit of exposure is the coulomb per kilogram, $C\ kg^{-1}$; $1\ R = 2.58\ x\ 10^{-4}\ C\ kg^{-1}$.

Exposure route: A pathway by which a radionuclide or other toxic material can enter the body. The main exposure routes are inhalation, ingestion, absorption through the skin, and entry through a cut or wound in the skin.

Fallout: The radioactive debris, once having been airborne, following a nuclear detonation, that has been deposited on the earth. Special forms of fallout include "local", "intermediate", and "global".

Fission: A nuclear transformation characterized by the splitting of a nucleus into at least two other nuclei and the release of a relatively large amount of energy.

Fission yield (or yield): The percentage of fissions leading to a particular nuclide by direct formation and by decay of precursors.

Kriging procedure: Interpolation technique used in this report to estimate the ^{131}I deposition densities in counties where measurements were not available.

Nuclide: A species of atom characterized by the constitution of its nucleus. The nuclear composition is specified by the number of protons Z, the number of neutrons N, and energy content; or alternatively, by the atomic number Z, the mass number = N + Z, and the atomic mass. To be regarded as a distinct nuclide, the atom must also be capable of existing for a measurable time; thus nuclear isomers are separate nuclides, whereas promptly decaying excited nuclear states and unstable intermediates in nuclear reactions are not so considered.

Plowshare: Name of nuclear tests carried out in the U.S. for civilian purposes, e.g., excavation.

Rad: A unit of absorbed dose. One rad is 100 ergs absorbed per gram of any material. It is replaced by the Gray, Gy in the SI system of units. One rad equals one one-hundredth of a Gray.

Radioactive decay: Spontaneous disintegration of the nucleus of a radionuclide.

Radioactive equilibrium: Establishment of a radionuclide parent-daughter relationship whereby the activity of the daughter radionuclide is approximately the same as that of the parent radionuclide.

Radioactivity: The process whereby certain nuclides undergo spontaneous disintegration in which energy is liberated, generally resulting in the formation of new nuclides. The process is accompanied by the emission of one or more types of radiation, such as alpha or beta particles and gamma photons.

Radionuclide: A radioactive, unstable nuclide.

Uncertainty: The range of values within which the true value is estimated to lie. It is a best estimate of possible inaccuracy due to both random and systematic error.

Yield (or energy yield): The total effective energy released in a nuclear explosion. It is usually expressed in terms of the equivalent tonnage of TNT required to produce the same energy release in an explosion. The accepted figure for the energy equivalent of one kiloton of TNT is 10^{12} calories. This corresponds to the complete fission of 0.057 kg of fissionable material or to the fission of 1.45 x 10^{23} nuclei.

CONVERSION FACTORS

In the metric system of weights and measures, designations of multiples and subdivisions of any unit may be arrived at by combining with the name of the unit the following prefixes:

E, exa, meaning 10^{18}

P, peta, meaning 10^{15}

M, mega, meaning 10^{6}

k, kilo, meaning 10^{3}

m, milli, meaning 10^{-3}

μ, micro, meaning 10^{-6}

n, nano, meaning 10^{-9}

p, pico, meaning 10^{-12}

f, femto, meaning 10^{-15}

a, atto, meaning 10^{-18}